In the United States Court of Federal Claims

OFFICE OF SPECIAL MASTERS

No. 12-629V
December 15, 2016
Not to be Published

L.A., a minor, by his parents and natural guardians, MAGNUS and BRANDI AKERSTROM,	*	
Petitioners,	*	
v.	*	FluMist; bilateral striatal necrosis ("BSN"); pre-existing *Mycoplasma pneumonaie*; substantial factors in causing BSN
SECRETARY OF HEALTH AND HUMAN SERVICES,	*	
Respondent.	*	

Clifford J. Shoemaker, Vienna, VA, for petitioners.
Glenn A. MacLeod, Washington, DC, for respondent.

MILLMAN, Special Master

RULING ON ENTITLEMENT[1]

On September 24, 2012, petitioners filed a petition under the National Childhood Vaccine Injury Act, 42 U.S.C. § 300aa-10-34 (2012), alleging that FluMist, which their son L.A. received on December 29, 2010, caused him seizures and encephalitis. Pet. at ¶¶ 8-10. Two days after receiving FluMist, L.A. had a seizure. Id. at ¶ 9.

[1] Because this unpublished decision contains a reasoned explanation for the special master's action in this case, the special master intends to post this unpublished decision on the United States Court of Federal Claims' website, in accordance with the E-Government Act of 2002, 44 U.S.C. § 3501 note (2012) (Federal Management and Promotion of Electronic Government Services). Vaccine Rule 18(b) states that all decisions of the special masters will be made available to the public unless they contain trade secrets or commercial or financial information that is privileged and confidential, or medical or similar information whose disclosure would constitute a clearly unwarranted invasion of privacy. When such a decision is filed, petitioner has 14 days to identify and move to redact such information prior to the document's disclosure. If the special master, upon review, agrees that the identified material fits within the banned categories listed above, the special master shall redact such material from public access.

On September 24, 2012, this case was assigned to former Special Master Daria Zane.

On October 17, 2012, the case was reassigned to the undersigned.

On October 18, 2012, petitioners moved for subpoena authority to obtain medical records, which the undersigned granted.

On January 4, 2013, petitioners filed their first set of medical records.

During the first telephonic status conference on January 23, 2013, the undersigned discussed settlement with counsel. As reflected in the undersigned's Order dated January 23, 2013, L.A. had a viral illness prior to his receipt of FluMist. On the morning of his later receipt of FluMist, L.A. had a fever of 101 degrees. In the afternoon, when he presented at Acute Care, he had a normal temperature and the pediatrician noted L.A.'s symptoms of a viral illness had resolved. L.A. received FluMist. He was very tired afterward and had a fever over the next three days. Two days after vaccination, L.A. had a tonic-clonic seizure lasting 20-25 minutes. He was in the hospital for over a month. His discharge diagnoses were encephalitis of unknown etiology, hyperkinetic movement disorder, expressive aphasia, and motor ataxia secondary to encephalitis of unknown etiology. Med. recs. Ex. 2, at 144. L.A. was again hospitalized a month and one-half later. He was discharged with the diagnoses of bilateral striatal necrosis ("BSN"), positive *Mycoplasma*[2] IgM and IgG, dystonia, hyperkinetic movement disorder, dysarthria, aphasia, and encephalopathy. Id. at 151.

The undersigned stated in her Order dated January 23, 2013 that L.A. was improving from the fever, cough, headache, stomachache, and malaise that the pre-vaccination infection caused him the day before he took the FluMist vaccine, although he still had a fever of 101 degrees in the morning, hours before he received FluMist vaccine. However, his symptoms worsened after he received FluMist. Order at 1. The undersigned informed counsel at the status conference and reiterated in her Order following the status conference that she had previously ruled for petitioners in similar cases, based on the Federal Circuit's decision in Shyface v. Sec'y of HHS, 165 F.3d 1344, 1345, 1347,1352-53 (Fed. Cir. 1999) (whole-cell DPT vaccine and E. coli infection both caused high fever in baby vaccinee who subsequently died; both the vaccine and the infection were equal substantial factors in the baby's vaccine injury and death; a vaccine need not be the predominant substantial factor in order for petitioners to prevail). The two cases of the undersigned which she mentioned at the status conference and listed in her Order as consistent with the Federal Circuit's decision in Shyface were Nash ex rel. Nash v. Secretary of Health and Human Services, No. 00-149V, 2002 WL 1906501 (Fed. Cl. Spec. Mstr. June 27,

[2] *Mycoplasma* is "a genus of bacteria…." Dorland's Illustrated Medical Dictionary 1216 (32d ed. 2012). Hereinafter, Dorland's. *Mycoplasma pneumoniae* is "a species that often causes inapparent infections or mild respiratory tract disease but can also cause mycoplasmal pneumonia…." Id. at 1217.

2002) (pneumococcal infection and fever preceded whole cell DPT vaccination, followed by increased fever and pneumococcal meningitis), and Herkert ex rel. Herkert v. Secretary of Health and Human Services, No. 97-518V, 2000 WL 141263 (Fed. Cl. Spec. Mstr. Jan. 19, 2000) (cytomegalovirus which infant had been fighting off preceded acellular DPT vaccination, followed by transverse myelitis one day post-vaccination). At the status conference, respondent's counsel stated he would accept a reasonable demand, although he had not yet received feedback from his client.

Petitioners' counsel made repeated motions for extensions of time to make a demand in order to obtain more medical records. It took a considerable amount of time for petitioners to finish a life care plan. On August 12, 2013, petitioners made a demand on respondent.

On September 9, 2013, the undersigned held a status conference, during which respondent's counsel said that HHS was actively considering petitioners' demand.

On October 21, 2013, the undersigned held a status conference, during which respondent's counsel stated he would respond to petitioners' demand with a counteroffer on either October 28, 2013 or October 29, 2013.

On October 30, 2013, the undersigned held a status conference, during which respondent's counsel said that HHS wanted to suspend negotiating a settlement until petitioners filed an expert report.

On December 2, 2013, respondent filed her Rule 4(c) Report, stating petitioners should not prevail because petitioners had not filed an expert report and none of L.A.'s treating doctors attributed his BSN to FluMist. Resp't's Rep. at 8, 10.

On December 3, 2013, the undersigned held a status conference, during which petitioners' counsel requested until February 28, 2014 to file petitioners' expert report.

Petitioners subsequently moved three times for extensions of time to file their expert report.

On July 14, 2014, petitioners filed the expert report of Dr. Carlo Tornatore, Professor and Vice Chairman of the Department of Neurology at Georgetown University Hospital and Director of the hospital's Multiple Sclerosis and Associated Autoimmune Disorders Center. Ex. 46. He wrote that FluMist is an attenuated live-virus vaccine containing two influenza A strains, including H_1N_1, and one influenza B strain. Id. at 7. He thought L.A.'s titer results for IgM and IgG of *Mycoplasma pneumoniae* were false positives. Id. at 8. He stated the onset of neurologic symptoms (the seizure) two days after vaccination was an appropriate interval for a post-infectious immune response to the FluMist vaccine, particularly since L.A. had received the same viral strains in his two previous FluMist vaccinations two months apart in 2009 (one containing just H_1N_1 and the other the remaining seasonal strains). Id. at 8-9.

Attached to Dr. Tornatore's report are six articles, the first of which is a case report entitled Influenza B Acute Necrotizing Encephalopathy: A Case Report and Literature Review, by M. Sazgar, et al., 28 Pediatr. Neurol. 396-99 (2003). The case report's authors wanted to increase awareness of influenza virus as a cause of acute encephalopathy and of acute necrotizing encephalopathy in western countries because there were only two cases reports each from the United Kingdom, Spain, and the United States. Id. at 396. The girl in the case report was nine years old with a one-day history of fever and sore throat. Id. Her doctor diagnosed her with tonsillitis and prescribed oral antibiotics. The next day, she developed fever, headache, vomiting, and diarrhea. Her local hospital admitted her and the doctors treated her with rehydration and acetaminophen. She became lethargic and shaky. Three days later, because of her persistent symptoms, the girl's local hospital transferred her to a university hospital where she had a generalized tonic-clonic seizure lasting several minutes. CT scan revealed bilateral symmetric basal ganglia hypodensities and brain edema. Her EEG showed diffuse slowing. The girl had not received an influenza immunization. Her six-year-old sister had also manifested fever and flu-like symptoms. Id. The hospitalized girl was negative for *Mycoplasma pneumoniae* IgM. Id. at 397. She underwent plasmapheresis. Unfortunately, her brain necrosis progressed and, on the fourth day of her intensive care unit admission, she died. Id. Neuropathology revealed multiple regions of bilateral acute necrosis involving the posterior two-thirds of the body of the putamen, hippocampal formation, collicular plate of the midbrain, and thalami. There were also areas of punctate hemorrhages within these lesions. The girl also had evidence of bilateral bronchopneumonia and early acute tubular necrosis. Id. In their discussion of this case, Sazgar et al. state, "The most common virus associated with acute necrotizing encephalopathy is influenza A …." Id. Influenza B grew from a nasopharyngeal swab of the girl's nasal passages or nares, which confirmed a recent infection with influenza B virus, but did not prove a causal relationship because the doctors did not perform polymerase chain reaction ("PCR") testing of her cerebrospinal fluid ("CSF") for influenza B or other associated viral DNA. Id. at 398.

Sazgar et al. note that acute necrotizing encephalopathy predominantly appears in the medical literature from Japan and Taiwan. Id. at 397. Its clinical presentation is "a rapidly deteriorating illness manifesting as fever and upper respiratory or gastrointestinal symptoms followed by seizures and coma. The pathologic hallmark of this condition is multifocal, symmetric brain lesions . . . . Gray and white matter are involved." Id.[3]

Sazgar et al. discuss the pathogenesis of influenza-associated encephalopathy and specifically acute necrotizing encephalopathy. Id. at 399. They posit that an immune-mediated

[3] Of note, L.A.'s pre-vaccination infection, involving fever, cough, headache, stomachache, and malaise, appeared to be resolving, although he still had 101 degrees of fever the morning of the vaccination, with a normal temperature at the Acute Care facility in the afternoon. After the vaccination, his fevers resumed, with somnolence, exhaustion, and abdominal pain. The FluMist L.A. received in 2010 contained two influenza A attenuated viruses and one influenza B attenuated virus.

mechanism may be the pathogenesis of this illness. In support of this theory, Sazgar et al. cite Sugaya's recent study in which doctors detected viral DNA for HHV-6 and HHV-7 in the CSF of four of eight patients with influenza-associated encephalopathy, suggesting to Sugaya, et al. that influenza virus may have reactivated the latent HHV-6 or HHV-7 in these patients' brains, causing encephalopathy or febrile seizures. Id. Sugaya et al. note that HHV-6 and HHV-7 induce numerous cytokines, such as interferon and tumor necrosis factor, and a dual infection of these viruses with influenza virus may enhance cytokine induction. Citing another Sugaya study, Sazgar et al. state that cytokine-induced neurotoxicity and the subsequent breakdown of the blood-brain barrier may contribute to inducing acute necrotizing encephalopathy. Id.

The second attachment to Dr. Tornatore's expert report is a Letter to the Editor, entitled Must Acute Necrotizing Encephalopathy of Childhood and Acute Bilateral Striatal Necrosis Be Differentiated? by H-S Wang, 30 Pediatr. Neurol. 4:299-300 (2004). Dr. Wang, a pediatric neurologist in Taiwan, states the Sazgar et al. article about the nine-year-old girl who died of acute necrotizing encephalopathy of childhood ("ANEC") due to influenza B virus was of great interest. Id. at 299. Wang discusses BSN, mentioning three causes, the last of which is acute disease due to a para-infectious or post-infectious setting. Id. at 300. In this group, he says acute bilateral striatal necrosis ("ABSN"), characterized by dystonic movement disorder and basal ganglia imaging abnormalities, manifests often after an upper respiratory tract infection, although doctors have not identified a specific microorganism. Id. Doctors have identified measles, *Mycoplasma pneumoniae*, and beta-hemolytic streptococci as possible causes since the early 1990s. Wang writes that BSN may have a similar clinical manifestation as acute encephalopathy as ANEC, viral precipitation, and perhaps cytokine storm in pathogenesis. Id.

Dr. D.B. Sinclair, one of the co-authors of the Sazgar article, responded to Dr. Wang's letter. Dr. Sinclair states that Dr. Wang's BSN case differs from Sazgar's acute necrotizing encephalopathy ("ANE") case in that BSN involves dystonia, post-infectious timing, and white matter involvement. The post-infectious time course and white matter changes in Dr. Wang's case suggest a post-infectious autoimmune disease like acute disseminating encephalomyelitis ("ADEM") rather than an acute inflammatory disease such as ANE. Id.

The fourth attachment to Dr. Tornatore's expert report is entitled Acute Neurological Dysfunction Associated with Destructive Lesions of the Basal Ganglia in Children, by F. Goutières and J. Aicardi, 12 Ann Neurol 328-32 (1982). The authors discuss the cases of three infants who had an infection and subsequent BSN. The first case involved a one-year-old boy who had a febrile illness with vomiting, diagnosed as pharyngitis. Two days later, he became obtunded, with stiffness of all four limbs, and was hospitalized with a fever. Months later, he died after a hip operation. Pathology was performed on his brain, but not on the other two patients described in the article since they survived. Id. at 328. Goutières and Aicardi identify three types of BSN, the third of which presents with abrupt neurological dysfunction following an acute systemic illness. Id. at 331. The three patients the authors discuss in this article fall within this third group. Goutières and Aicardi state the temporal relationship between an acute

febrile illness and the onset of neurological signs is consistent with a para-infectious encephalitis.[4]

The fifth attachment to Dr. Tornatore's expert report is entitled Neurological Manifestations of Influenza Infection in Children and Adults: Results of a National British Surveillance Study, by A. Goenka, et al., 58 Clin. Infec. Dis 6:775-84 (2014). The authors note that influenza A (H_1N_1) in 2009 led to an increase in reports of neurological manifestations. Id. at 776. They surveyed the United Kingdom nationally to find neurological manifestations of influenza and found four adults and 21 children to study. Id. None of the Goenka subjects had received flu vaccine. Id. at 783. There were four cases of acute necrotizing encephalopathy ("ANE"). Id. at 776. All patients had fever and/or respiratory symptoms. Id. Influenza A was detected by PCR in 84 percent of patients, of whom 95 percent had the H_1N_1 subtype. Influenza B was detected in 16 percent of patients. Id. One child and one adult had co-infections with streptococcus pneumoniae, the first with pneumococcal meningitis, and the second with pneumococcal sepsis. Id. at 776, 779. One of the ANE patients, a two-year-old boy, had a two-day history of pyrexia, diarrhea, and vomiting. Unfortunately, he died. Id. at 780. The authors state the most commonly associated pathogen with ANE is influenza. Id. at 781. The authors describe two broad categories of influenza-like illness followed by neurological manifestations, the first of which is acute, in association with an innate immune response and a cytokine storm. Id. at 782. Doctors have found increased concentrations of pro-inflammatory cytokines in the serum and CSF of children with neurological manifestations of influenza. Id. Two patients had co-infection with streptococcus pneumonia and died. Pneumococcal/influenza respiratory co-infection is a recognized distinct clinical entity associated with poor outcome. Id. They state, "While the pathophysiology underlying the synergy between the two organisms is poorly understood, proposed factors include the role of influenza virulence factors in epithelial damage and subsequent facilitated entry of pneumococcus, as well as upregulation of the inflammatory response." Id.[5]

The sixth attachment to Dr. Tornatore's expert report is entitled Acute Encephalopathy with Bilateral Striatal Necrosis. A Distinctive Clinicopathological Condition, by S. Rosemberg, et al., 23 Neuroped 310-15 (1992). The authors describe two distinct clinical entities, the second of which has an acute onset, which nearly always follows an infectious disease, and consists of disturbance of consciousness, seizures, postural troubles, dystonia, and tremors. Id. 310. They describe two cases and remark that the main characteristics of the children's neurological syndrome were acute onset with depression of consciousness, muscular rigidity, tremor of the upper extremities, and dystonic movements of the hands. Id. at 312. The children's symptoms

[4] Of note, the first patient's onset of neurological symptoms was two days after his febrile illness. In L.A.'s case, his seizure occurred two days after he had a fever of 101 degrees in the morning and FluMist vaccine in the afternoon.

[5] Of note, in Dr. Tornatore's subsequent expert reports and his testimony, he describes as "synergy" or "synergistic" the effect of L.A.'s FluMist on his pre-existing infection in causing L.A.'s BSN.

began a few days following an upper respiratory tract infection associated with tonsillitis in one case, and with diarrhea in the other case. Id. The authors analyze 13 cases of BSN, all following an infectious illness like upper respiratory tract infection (9 cases), mumps (2 cases), *Mycoplasma pneumoniae* (1 case), and acute otitis media (1 case). Id. They state, "The beginning of neurologic disease was always abrupt with disturbance of consciousness ranging from lethargy to coma." Id.

On July 18, 2014, the undersigned held a status conference, during which respondent's counsel said he sent petitioners' expert Dr. Tornatore's report to HHS and wanted 60 days to file respondent's expert report, due September 16, 2014. Petitioners' counsel stated that respondent made a counteroffer to petitioners' demand.

Respondent subsequently made numerous motions for an extension of time to file respondent's expert report. Petitioners filed more medical records.

On October 31, 2014, respondent filed the expert reports of Dr. Michael H. Kohrman, a pediatric neurologist, and Dr. Hayley Altman Gans, a pediatric infectious disease specialist. Exs. A, C. Dr. Kohrman states, that L.A.'s illness began with headache, fever, and stomachache on December 28, 2010 following exposure to a sick family member. Ex. A, at 9. He states that L.A.'s clinical symptoms, which began before FluMist vaccination, persisted after FluMist vaccination and intensified. Id. L.A.'s positive IgM and IgG serology to *Mycoplasma pneumoniae* during this acute phase means L.A. had an acute infection with *Mycoplasma pneumoniae*. Id. Dr. Kohrman does not believe FluMist caused L.A.'s BSN because there are no case reports of FluMist associated with BSN or acute necrotizing encephalopathy of childhood. Id. at 10. Dr. Kohrman believes L.A. had a single infectious process prior to his FluMist vaccination consisting of cough, fever, and stomachache, which continued over the next three days and progressively became more symptomatic. (L.A.'s pediatrician noted on December 29, 2010 that L.A.'s viral syndrome, manifesting as fever, cough, headache, stomachache, and malaise, resolved before L.A. received FluMist. Med. recs. Ex. 1, at 19.) Dr. Kohrman cites Dr. Abram, L.A.'s treating pediatric neurologist, who entertained a strong suspicion that *Mycoplasma pneumoniae* caused L.A.'s BSN. Ex. A, at 10. Attached to Dr. Kohrman's expert report are six articles associating *Mycoplasma pneumoniae* with BSN or a similar encephalopathy. Tabs 4-9, attached to Ex. A.

Dr. Gans states there are no reports in the medical literature associating FluMist with BSN. Ex. C, at 5-6, 7. She asserts that *Mycoplasma pneumoniae* caused L.A.'s cough. Id. at 6. She says L.A.'s post-vaccinal fever and progressive neurologic symptoms are consistent with a post-infectious inflammatory illness. Id. She notes that neurological progression was rapid. Id. She also notes that L.A. did not have mycoplasmal pneumonia but did have upper airway disease. Id. Dr. Gans thinks L.A.'s neurologic symptoms began one day after receiving FluMist because of his increased sleepiness. Id. at 7. She thinks one and two days (his seizure was two days post-FluMist) are a very rapid onset for an autoimmune process, making FluMist's role in causing L.A.'s BSN improbable. Id. Dr. Gans further states that FluMist, an attenuated viral

vaccine, cannot cause an influenza infection or illness. Id. at 8. She attributes L.A.'s BSN to *Mycoplasma pneumoniae*. Id. Attached to Dr. Gans's expert report are three articles relating *Mycoplasma pneumoniae* to neurologic problems, plus other articles on influenza and infections.

On November 5, 2014, the undersigned held a status conference, during which petitioners' counsel said being on a dual track, i.e., attempting to settle the case and preparing for a hearing, was fine. The undersigned asked him to obtain a supplemental expert report from Dr. Tornatore responding to respondent's experts' Dr. Kohrman's and Dr. Gans's reports. Petitioners' counsel wanted 90 days or until February 11, 2015 to file Dr. Tornatore's supplemental expert report. Respondent's counsel stated that settlement was not dead, but he wanted to continue on the litigative track.

Petitioners filed more medical records and moved twice for extensions of time to file Dr. Tornatore's supplemental expert report.

On May 11, 2015, petitioners filed Dr. Tornatore's supplemental expert report. Ex. 53. He states that he noted in his initial report that both *Mycoplasma* and influenza infections can cause BSN as a post-infectious autoimmune phenomenon. Ex. 53, at 1. He thinks it is biologically plausible for FluMist, which contains attenuated live-virus vaccines, to recapitulate an autoimmune cascade similar to wild influenza virus since both the wild virus and FluMist share antigenic homology. Id. Even accepting that L.A.'s pre-vaccinal infection was *Mycoplasma pneumoniae*, Dr. Tornatore states that L.A. had a concurrent infection with attenuated influenza viral strains, which stimulated an immune response to these viral antigens. Id. at 2. He states that BSN is a result of an aberrant autoimmune response to viral and bacterial antigens. If both *Mycoplasma* antigens and influenza antigens were present concurrently in L.A., Dr. Tornatore states it was biologically plausible that a synergistic immune response occurred, with the FluMist further stimulating the aberrant response. Id. Dr. Tornatore mentioned he had six years of training in virology as a post-doctoral fellow, during which he analyzed questions similar to those involved in this case dealing with the interface among the nervous system, the immune system, and viruses. Id.

On May 18, 2015, the undersigned held a status conference, during which respondent's counsel said he would send Dr. Tornatore's supplemental expert report to HHS. Respondent's counsel recognized this case involves a Shyface issue.

On June 19, 2015, the undersigned held a status conference, during which respondent's counsel said HHS had read Dr. Tornatore's supplemental expert report and was consulting with a pediatric immunologist. L.A.'s condition required extensive money. HHS wanted to file a report from this pediatric immunologist, Dr. Steven McGeady. The deadline was August 21, 2015.

Respondent made motions for an extension of time to file Dr. McGeady's expert report.

On September 24, 2015, respondent filed the expert report of Dr. Steven J. McGeady, a pediatric immunologist now practicing as a pediatrician specializing in allergy. Ex. E1. (Respondent subsequently filed a corrected expert report from Dr. McGeady as Exhibit G.) Dr. McGeady writes that L.A. had an intercurrent viral illness before receiving FluMist. After receiving FluMist, L.A.'s parents noted he was excessively somnolent and then L.A. had a seizure. Ex. E1, at 3. Dr. McGeady's opinion is that *Mycoplasma pneumoniae* was more likely than the FluMist vaccine to have caused L.A.'s BSN. Id. at 4. L.A. had a headache on December 28, 2010, followed the next morning by a fever of 101 degrees. Id. Because L.A.'s father and brother had been sick, an illness or illnesses were present in the family at that time. Id. At the pediatrician's office in the afternoon of December 29, 2010, L.A. seemed to be well and he was afebrile. He received FluMist. Over the next 48 hours, L.A. continued to be unwell and had considerable somnolence and intermittent fever. "This sequence suggests a continuous illness with onset of symptoms on 12/28/2010, ensuing fever and worsening lethargy over the next several days, leading to a seizure on 12/31/2010." Id. at 4-5. Dr. McGeady states that a head CT scan revealed a fully developed central nervous system lesion only 48 hours after FluMist vaccination. Dr. McGeady thinks this is too rapid an onset for FluMist to be causative. Id. at 5. Dr. McGeady states L.A.'s fever preceded the FluMist and then, subsequently, L.A. continued to have fever and somnolence. Dr. McGeady opines that no physiologic mechanism could explain such a rapid response after FluMist. Id. Dr. McGeady states there is no medical literature attributing BSN to FluMist received 48 hours earlier. Id. at 8.

Also on September 24, 2015, respondent filed Dr. McGeady's supplemental expert report in response to Dr. Tornatore's expert report (Ex. 53). Ex. E2. Dr. McGeady says Dr. Tornatore's opinion is inconsistent with L.A.'s clinical history of febrile illness and extreme somnolence both before and immediately after his receipt of FluMist on December 29, 2010. Id. at 1-2. Dr. McGeady states the presence of profound somnolence on December 29 and 30, 2010 and L.A.'s pre-vaccinal fever the morning of December 29, 2010 "argue strongly against the role of an immune reaction" to FluMist because such a reaction, even if it were anamnestic, would require several days to become manifest. Id. at 2. Dr. McGeady writes that even if L.A. retained T-memory cells from prior FluMist vaccinations in 2009, the detection of fully developed cerebral lesions 40 hours after FluMist vaccination is too soon for FluMist to be causal. Id. Dr. McGeady thinks Dr. Tornatore's theory that FluMist may have produced a synergistic immune reaction with *Mycoplasma* infection is highly speculative and devoid of supportive laboratory evidence. Id. at 3. Dr. McGeady says he does not know of any laboratory tests that could demonstrate "synergy between the independent immune reactions" to *Mycoplasma* and FluMist, nor does medical literature describe such phenomena apart from describing the use of adjuvants to enhance a body's immune response to an antigen. Id. Dr. McGeady states L.A.'s "response to the FluMist is conflated with the evolving picture of his encephalitis and bilateral striatal necrosis. It is not possible to separate the clinical features, if any, of his response to the FluMist, but there is no clinical evidence of any sort of aberrant response to this vaccine." Id. Dr. McGeady expounds upon FluMist's localization to the nares as proof that no one taking FluMist could have a systemic, including an inflammatory, response to it. Id. at 3-4.

On October 16, 2015, the undersigned held a status conference, during which petitioners' counsel requested a deadline of November 30, 2015 to file Dr. Tornatore's response to respondent's expert Dr. McGeady's reports (Exs. E1 and E2). The undersigned discussed again (and included in an Order she issued the same date) her prior decisions in Nash and Herkert and cited additional decisions the undersigned wrote consistent with the Federal Circuit's opinion in Shyface See Mouille v. Sec'y of HHS, No. 05-1204V, 2009 WL 4456207 (Fed. Cl. Spec. Mstr. Nov. 17, 2009) (upper respiratory infection and flu vaccine led to encephalitis); Pearson v. Sec'y of HHS, No. 03-2751V, 2008 WL 5093378 (Fed. Cl. Spec. Mstr. Nov. 6, 2008) (upper respiratory infection and hepatitis B vaccine led to transverse myelitis); and Camerlin v. Sec'y of HHS, No. 99-615V, 2003 WL 22853070 (Fed. Cl. Spec. Mstr. Oct. 29, 2003) (otitis media and haemophilus B influenza vaccine led to either transverse myelitis or ADEM). Respondent's counsel said he would communicate the undersigned's views to HHS.

On November 30, 2015, petitioners filed Dr. Tornatore's second supplemental report responding to Dr. McGeady's supplemental expert report. Ex. 54. Dr. Tornatore recounts the findings of two reports, indicating that *Mycoplasma pneumoniae* can increase production of interleukin-6 and interleukin-8, and FluMist can also increase production of interleukin-8, a cytokine that is a potential factor in causing BSN. Id. at 1-2. Dr. Tornatore comments, "Good clinical practice has dictated that vaccination during an acute infection is not wise given the concern that an aberrant synergistic response could occur between the vaccine and the organism causing the infection." Id. at 2.

The paper to which Dr. Tornatore referred discussing detection of interleukins-6 and -8 in serum and CSF in the context of BSN lesions after *Mycoplasma pneumoniae* infection is entitled, Case Report. Reversible bilateral striatal lesions following *Mycoplasma pneumoniae* infection associated with elevated levels of interleukins 6 and 8, Z-F Yuan, et al., 38 Brain and Development 149-53 (2016). Ex. 57. (The version petitioners filed as Exhibit 57 does not have the page numbers that the journal included in its 2016 publication, i.e., pages 149-53. Since the 2016 publication is not in evidence, the undersigned will refer to the page numbers in Ex. 57 available in 2015, i.e., pages 1-5.) The authors state that *Mycoplasma pneumoniae* is a common cause of respiratory tract infection in children. Ex. 57, at 1. One of the most common manifestations outside the lungs is central nervous system ("CNS") dysfunction, including *inter alia* encephalitis or meningoencephalitis, ADEM, and a few cases of BSN. Id. The authors also state that the precise pathogenic mechanism by which *Mycoplasma pneumoniae* causes neurological disorders remains unknown. Id. Earlier studies reveal that inflammatory cytokines such as interleukin-6 ("IL-6") and interleukin-8 ("IL-8") are involved in the development of CNS symptoms that *Mycoplasma pneumoniae* causes. Id. at 1-2. Three mechanisms have been proposed to explain the pathogenesis of CNS symptoms due to *Mycoplasma pneumoniae*: (1) cytokine production (direct type); (2) autoimmune-mediated mechanisms (indirect type); and (3) vascular occlusion. Id. at 4. Other scientists posit a role for increased IL-6 and IL-8 in the inflammatory processes leading to CNS dysfunction. Id. Yuan et al. notice in this child's case that her IL-8 increased significantly in her CSF. Id. After doctors successfully treated the girl's BSN, her levels of IL-6 and IL-8 reduced markedly. Id. By one month, they had returned to

normal in her serum. Id. To Yuan et al., these results suggest that IL-6 and IL-8 play important roles in the pathogenesis of BSN. Id. Another author posited that an underlying mechanism for BSN might be local vascular injury mediated by cytokines and chemokines induced by *Mycoplasma pneumoniae*. Id. Using this analysis, Yuan et al. posit that elevated levels of IL-6 and IL-8 may cause regional endovasculitis, which further induces focal vascular occlusion, finally causing a bilateral striatal lesion. Id. Yuan et al. include Table 1, which depicts 12 reported cases in the medical literature of reversible striatal lesions associated with *Mycoplasma pneumoniae* infection. Id. at 3. In the seventh case, there was a one-day onset between the respiratory symptoms to the CNS symptoms of Parkinsonism and dystonia in an eight-year-old male. Id. In the eleventh case, there was a two-day onset between the respiratory symptoms and encephalopathy and dystonia in a five-year-old male. Id.

The paper to which Dr. Tornatore referred in his second supplemental report is entitled, Localized Mucosal Response to Intranasal Live Attenuated Influenza Vaccine in Adults by M.I. Barria, et al., 207 J Infec Dis 115-24 (2013). Ex. 55. Live attenuated influenza vaccine ("LAIV") produced enhancement in serum antibody response in 24 percent of subjects. Id. at 7.

On December 16, 2015, the undersigned held a status conference, during which respondent's counsel stated petitioners were not motivated to settle because respondent could not get them to agree to a litigative risk discount in damages in light of the undersigned's prior discussions with counsel. Respondent's counsel did not know if HHS would let him settle. The undersigned directed counsel to speak to their clients to see if they would settle.

On December 5, 2016, petitioners filed their joint affidavit. Ex. 60.

On December 7, 2016, this case went to hearing.

FACTS

L.A. was born on February 16, 2005.

On December 29, 2010, L.A. went to Acute Care, complaining of having had a cough, headache, stomachache, and malaise. Med. recs. Ex. 1, at 19. His sibling had otitis media, which resolved. L.A.'s temperature in the Acute Care office was 98.1 degrees. The doctor's diagnosis was that his viral syndrome resolved and L.A. received FluMist.

L.A. continued to have fever the next two days between 101 and 101.5 degrees with periods of excess sleepiness. Med. recs. Ex. 18, at 5. On December 31, 2010, Jacksonville Fire/Rescue reported that L.A. had a grand mal seizure lasting about 20 minutes. His skin temperature was warm. His mother stated the child had had a fever for three days. Med. recs. Ex. 3, at 2.

On December 31, 2010, at 12:23 p.m., L.A. went to Baptist Medical Center and Wolfson Children's Hospital with a temperature of 101.3 degrees. Med. recs. Ex. 3, at 140. He was diagnosed with complex febrile seizure and meningitis. Also on December 31, 2010, L.A. saw Dr. Deborah C. Abram, a pediatrician, who wrote that on Tuesday evening, December 28, 2010, L.A. had a headache. Med. recs. Ex. 18, at 3. On Wednesday morning, December 29, 2010, L.A. woke with a temperature of 101 degrees. His mother took him to Primary Care where the physician examined L.A. and told the mother that L.A. did not have strep or the flu, looked good, had had a viral illness, and gave L.A. FluMist, sending him home. L.A.'s fevers continued over the next two days. He was very sleepy, and fell asleep at the dinner table. His mother said he had slept for four hours in the middle of the living room. He was exhausted with temperatures in the 101 to 101.5 degree range. He did not have vomiting or diarrhea. On the morning of admission, December 31, 2010, L.A. woke at 7:45 a.m. and complained of abdominal pain. He then fell back asleep and woke at 12:45 p.m., complaining of abdominal pain. The mother drove L.A. to the emergency room, but he said he was fine and they turned around to go home. When they were almost home, L.A. was staring with his eyes deviated to the left and he was stiff and unresponsive to his mother calling his name and shaking him. He was stiff all over and had a tonic-clonic movement. His mother called 911. L.A. seized for 25 minutes when EMS came, and gave him 4.2 mg. of Valium, stopping the seizure. The mother said the past three days, L.A. had been sleeping a lot. The father also had a fever and headache a week and one-half earlier. L.A.'s white blood cell count was 30,000. Id. at 4-6.

From December 31, 2010 to February 2, 2011, L.A. was hospitalized at Wolfson Children's Hospital. Med. recs. Ex. 2, at 144. The discharge summary states L.A. had encephalitis of unknown etiology, hyperkinetic movement disorder, expressive aphasia, and motor ataxia secondary to encephalitis. Dr. Raj D. Sheth, a neurologist, wrote L.A. had possible autoimmune encephalitis. Id. at 145. During the hospitalization, on January 2, 2011, L.A. underwent an EEG, which was abnormal. Med. recs. Ex. 18, at 9.

On January 28, 2011, a VAERS report was filled out, stating that L.A. had a viral syndrome just prior to his encephalitis. Med. recs. Ex. 9, at 1.

On March 14, 2013, L.A. saw Dr. Leon Dure, a neurologist. Med. recs. Ex. 48, at 4. In recounting L.A.'s history, Dr. Dure writes that after being admitted to his local hospital, L.A. was found to be suffering from an influenza infection and developed a progressive encephalopathy, indicative on MRI of bilateral striatal necrosis. Id.

On July 31, 2013, Dr. Harry S. Abram, Jr., L.A.'s pediatric neurologist, wrote to petitioners' attorney, stating L.A. had significant neurological disabilities secondary to his "vaccine-related encephalopathy," and listing his recommendations for L.A.'s care. Med. recs. 52 at 33.

On September 15, 2013, L.A. saw Dr. Irene A.C. Malaty, a neurologist, who noted what happened to L.A. was likely an autoimmune or para-infectious event. Med. recs. Ex. 50, at 8.

TESTIMONY

Magnus Akerstrom, L.A.'s father, testified first and offered a commentary on a 15-minute DVD, which petitioners showed in the courtroom, depicting L.A. on December 25 and 26, 2010 when he seemed completely healthy.

Dr. Carlo Tornatore testified next for petitioners. He has seen one BSN case in his career. He explained that BSN is an immune-mediated disease. It fits within the category of ADEM. The problem comes from the blood, i.e., inflammation starts outside the brain. The trigger of the inflammation is immune modulation. An infection, which can be viral or bacterial (such as *Mycoplasma pneumoniae*), targets the blood-brain barrier. Symptoms occur abruptly, even within 24-48 hours. Dr. Tornatore believed that L.A.'s test result for IgM for *Mycoplasma pneumoniae* was a false positive. L.A. had positive antibodies to striated muscle, which is associated with myasthenia gravis, but he does not have myasthenia gravis. L.A. had positive antibodies to thyroid, but he does not have thyroid problems.

Dr. Tornatore believed that FluMist augmented L.A.'s immune system response through synergy with his pre-vaccinal infectious illness. He testified that influenza A virus is the most common infection associated with BSN. FluMist contains two attenuated viral strains of influenza A and one attenuated viral strain of influenza B.

On cross-examination, Dr. Tornatore recognized that L.A. had a systemic illness on December 28, 2010, consisting of non-specific symptoms of headache, fever, stomachache, and cough. L.A. had a fever of 101 degrees the morning of December 29, 2010. When his mother brought him and his brother to the pediatrician in the afternoon, L.A. had a normal temperature and no symptoms. His neurological symptoms related to BSN occurred just two days later on December 31, 2010, when he had a seizure, and a head CT scan showed hypodensity in his left basal ganglia. Dr. Tornatore testified L.A. had a systemic response to FluMist.

The undersigned asked Dr. Tornatore if he believed that but for FluMist, L.A. would not have had BSN, and he replied in the affirmative. The undersigned asked Dr. Tornatore if he regarded both the pre-vaccinal infection and FluMist as substantial factors in causing L.A.'s BSN, and he replied in the affirmative.

Dr. Hayley Gans testified first for respondent. L.A. was a healthy child who, on December 28, 2010, had an acute febrile illness with non-specific symptoms. L.A. was still mounting an immune response on December 29, 2010 when he had a fever of 101 degrees in the morning. She testified that FluMist did not influence his clinical course.

On cross-examination, petitioners' counsel reminded Dr. Gans that L.A. had received FluMist on September 9, 2009, followed a month later by an episode of flu. L.A. received another FluMist in November 2009. During the winter flu season of 2009-2010, there were two

flu vaccinations, a monovalent one containing H_1N_1 and a trivalent one containing three flu strains.

Dr. Gans admitted that someone receiving FluMist can have as a consequence nasal congestion, cough, fever, headaches, wheezing, abdominal pain, and fatigue, symptoms L.A. had after his receipt of FluMist on December 29, 2010. When petitioners' counsel said the doctors in the hospital never treated L.A. for *Mycoplasma pneumoniae*, Dr. Gans replied that by the time the doctors discovered he had *Mycoplasma pneumoniae*, treating it would not have done any good because what L.A. was experiencing was the immune-mediated consequence of the infection.

Dr. Michael Kohrman testified second for respondent. He has never seen a BSN case. He said that ADEM (the category within which BSN fits) is a reaction to either a bacterial or viral infection or to a vaccine. Although wild influenza virus has been associated with BSN, FluMist has not been so associated in the literature. L.A.'s December 31, 2010 brain CT scan showing hypodensity was a marker of injury because it showed tissue change. L.A.'s subsequent brain MRI showed global greater signal changes. Dr. Kohrman said that these sequences take three days to appear on a brain MRI, which means the process began three to five days before December 31, 2010.

Dr. Kohrman testified that *Mycoplasma pneumoniae* was a sufficient and necessary cause of L.A.'s BSN and that no other cause, i.e., FluMist, was needed for causation. He considered L.A.'s prolonged somnolence between vaccination and seizure indicative of an increasing immune-mediated encephalopathy.

There proceeded an extended discussion of the two-day onset interval, which Dr. Kohrman rejected and Dr. Tornatore accepted as causative. Petitioners submitted into evidence as Exhibit 63 an article entitled, Acute disseminated encephalomyelitis, by S. Tenembaum, et al., 68 (Supp. 2) Neur:S23-S36 (2007), which states that ADEM begins within two days to four weeks after an antigenic challenge. Id. at S23-S24. Moreover, in the fourth attachment to Exhibit 46, page 328, Goutières and Aicardi mention presenting symptoms at two days in a sub-group of ADEM. Petitioners also submitted into evidence page 299 from Adverse Effects of Vaccines. Evidence and Causality, K. Stratton et al., eds., Institute of Medicine (2012), as Ex. 64. That page cites an article by Froissart et al., describing a woman who had vomiting, fever, and a stiff neck leading to a diagnosis of meningoencephalitis two days after receiving flu vaccine. The prior year, she had similar symptoms also two days after receiving flu vaccine.

Dr. Steven McGeady testified third for respondent. Dr. McGeady previously submitted, as part of his reference 5 filed September 24, 2015, pages 293-98 from the same chapter of Adverse Effects of Vaccines. Evidence and Causality as petitioners' Exhibit 64, but not including page 299. He testified that the medical literature does not support vaccine injury in this case, particularly since it occurred too soon after FluMist. He would pick four to five days as the optimal onset interval. Dr. McGeady also stated that doctors are unsure of the immune

mechanisms underlying BSN, although some say it is autoimmune. He has never seen a BSN case.

The undersigned asked each of respondent's experts if it was good practice for L.A.'s pediatrician to give L.A. FluMist the same day as his having a fever of 101 degrees in the morning. The undersigned stated her understanding that a parent does not even send an ill child to school until 24 hours have passed without a fever. Dr. Gans had previously testified that the fever of 101 degrees the morning of December 29, 2010 showed that L.A. was fighting off the infection he had pre-vaccine. Each of respondent's experts stated that it was completely appropriate to vaccinate L.A. the afternoon of December 29, 2010 because it is general pediatric practice not to miss an opportunity to vaccinate a child because the doctor does not know when he will see the child again. Moreover, if the child contracts the disease that the vaccine would prevent, the risks from the disease are far worse than the risk from the vaccination. Dr. Gans recognized the consensus that a parent does not send a child to school until 24 hours have elapsed without a fever, but stated that the public policy of avoiding a missed opportunity to vaccinate was still valid. The undersigned asked each of respondent's experts if he or she would be vaccinated if he or she had a cold, and the answer from each of respondent's experts was in the affirmative.

At the end of the hearing, the undersigned said that she was leaning toward ruling for petitioners, relying on the Federal Circuit's admonition in Althen that, in a close case, the special masters are to rule for petitioners. See Althen v. Sec'y of HHS, 418 F.3d 1274 (Fed. Cir. 2005). The undersigned said that if she did rule for petitioners, she thought petitioners should receive $250,000.00 for L.A.'s past pain and suffering since it has been six years since his injury.

DISCUSSION

To satisfy their burden of proving causation in fact, petitioners must prove by preponderant evidence: "(1) a medical theory causally connecting the vaccination and the injury; (2) a logical sequence of cause and effect showing that the vaccination was the reason for the injury; and (3) a showing of a proximate temporal relationship between vaccination and injury." Althen, 418 F.3d at 1278. In Althen, the Federal Circuit quoted its opinion in Grant v. Secretary of Health and Human Services, 956 F.2d 1144, 1148 (Fed. Cir. 1992):

> A persuasive medical theory is demonstrated by "proof of a logical sequence of cause and effect showing that the vaccination was the reason for the injury[,]" the logical sequence being supported by "reputable medical or scientific explanation[,]" i.e., "evidence in the form of scientific studies or expert medical testimony[.]"

Althen, 418 F.3d at 1278.

Without more, "evidence showing an absence of other causes does not meet petitioners' affirmative duty to show actual or legal causation." Grant, 956 F.2d at 1149. Mere temporal association is not sufficient to prove causation in fact. Id. at 1148.

Petitioners must show not only that but for FluMist, L.A. would not have had BSN, but also that FluMist was a substantial factor in causing his BSN. Shyface v. Sec'y of HHS, 165 F.3d 1344, 1352 (Fed. Cir. 1999).

In Capizzano v. Secretary of Health and Human Services, 440 F.3d 1317, 1325 (Fed. Cir. 2006), the Federal Circuit said: "we conclude that requiring either epidemiologic studies, rechallenge, the presence of pathological markers or genetic disposition, or general acceptance in the scientific or medical communities to establish a logical sequence of cause and effect is contrary to what we said in Althen . . . ." Such an approach is inconsistent with the use of circumstantial evidence. Id. The Federal Circuit stated in Althen, 418 F.3d at 1280, that "the purpose of the Vaccine Act's preponderance standard is to allow the finding of causation in a field bereft of complete and direct proof of how vaccines affect the human body."

Close calls are to be resolved in favor of petitioners. Capizzano, 1440 F.3d at 1327; Althen, 418 F.3d at 1280.

"Petitioner need not show that the vaccine was the sole or predominant cause of her injury," just that the vaccine was a substantial factor in causing her injury. De Bazan v. Sec'y of HHS, 539 F.3d, 1347, 1351 (Fed. Cir. 2008).

In essence, the special master is looking for a medical explanation of a logical sequence of cause and effect (Althen, 418 F.3d at 1278; Grant, 956 F.2d at 1148), and medical probability rather than certainty (Knudsen v. Sec'y of HHS, 35 F.3d 543, 548-49 (Fed. Cir. 1994)). To the undersigned, medical probability means biologic credibility rather than specification of an exact biologic mechanism. As the Federal Circuit stated in Knudsen:

> Furthermore, to require identification and proof of specific biological mechanisms would be inconsistent with the purpose and nature of the vaccine compensation program. The Vaccine Act does not contemplate full blown tort litigation in the Court of Federal Claims. The Vaccine Act established a federal "compensation program" under which awards are to be "made to vaccine-injured persons quickly, easily, and with certainty and generosity." House Report 99-908, supra, at 3, 1986 U.S.C.C.A.N. at 6344.
>
> The Court of Federal Claims is therefore not to be seen as a vehicle for ascertaining precisely how and why DTP and other vaccines sometimes destroy the health and lives of certain children while safely immunizing most others.

35 F.3d at 549.

As for epidemiological support for causation, the Federal Circuit in Knudsen, 35 F.3d at 551, ruled for petitioners even when epidemiological evidence directly opposed causation from DPT vaccine. The case concerned the cause of a baby's encephalopathy after a vaccination. Respondent provided evidence that more encephalopathies are caused by viruses than by vaccines, convincing the special master to rule against petitioners. However, the Federal Circuit thought the epidemiologic evidence should not bar petitioners from prevailing. Even though epidemiological evidence supported respondent's defense in Knudsen that viruses were more likely to cause encephalopathy than vaccinations, the Federal Circuit held that that fact alone was not an impediment to recovery of damages. In Knudsen, the Federal Circuit stated:

> The bare statistical fact that there are more reported cases of viral encephalopathies than there are reported cases of DTP encephalopathies is not evidence that in a particular case an encephalopathy following a DTP vaccination was in fact caused by a viral infection present in the child and not caused by the DTP vaccine.

35 F.3d at 550.

The special masters "are entitled–indeed, expected–to make determinations as to the reliability of the evidence presented to them and, if appropriate, as to the credibility of the persons presenting that evidence." Moberly v. Sec'y of HHS, 592 F.3d 1315, 1325 (Fed. Cir. 2010).

In this case, the undersigned sees the very defenses respondent presented in prior cases but which the Federal Circuit rejected in ruling for petitioners. In Knudsen, respondent's expert espoused a "unity" theory that "the only single thing that could explain all of [the baby's] symptoms, encephalitic and non-encephalitic, was a systemic viral infection." 35 F.3d at 550. This is very similar to Dr. Kohrman's testimony that *Mycoplasma pneumoniae* is a necessary and sufficient cause of A.L.'s BSN, and no other cause, i.e., FluMist, was necessary. The Federal Circuit in Knudsen rejected respondent's unity theory, deciding that the baby's rhinorrhea was due to a virus, but her encephalopathy was due to her DPT vaccination. Id.

Respondent also defends based on the lack of epidemiological studies and medical literature supportive of FluMist playing any role in causing BSN. Moreover, respondent argue that since doctors do not know the pathological cause of BSN, although it seems to be immune-mediated, petitioners cannot prove the mechanism of FluMist causing BSN, even in tandem with a pre-vaccinal infection. In Knudsen, the Federal Circuit stated petitioner does not need epidemiological support in order to prevail and does not have the burden of proving a specific biological mechanism. Id. In Althen and Capizzano, the Federal Circuit stated petitioner does not need to file supportive medical literature in order to prevail.

A great deal of discussion in this case concerned the fact the FluMist is manufactured so that it will not replicate outside the nares or nostrils. Therefore, respondent's experts posited that it could not cause any harm to the rest of the body. This defense eliminates the idea that FluMist can lead to systemic symptoms (such as fever, headache, stomachache, cough, stuffy nose). It also eliminates the idea that FluMist can lead to an immune-mediated response, just as an infection can. Dr. Gans noted that there was no point in treating L.A.'s infection identified as *Mycoplasma pneumoniae* in the hospital because L.A. had moved on to the immune-mediated phase. The undersigned has ruled in another case dealing with FluMist that it can lead to an immune misdirection, as petitioners' expert described. In Agnew v. Secretary of Health and Human Services, No. 12-551V, 2016 WL 1612853 (Fed. Cl. Spec. Mstr. Mar. 30, 2016), the undersigned ruled in favor of petitioners based on their expert immunologist Dr. Joseph Bellanti's testimony that FluMist led to immune misdirection, causing the boy at issue acute hepatitis leading to liver failure and a liver transplant. In addition, the Chief Special Master ruled for petitioner in Day v. Secretary of Health and Human Services, No. 12-551V, 2016 WL 1612853 (Mar. 30, 2016), holding that both human papillomavirus vaccine and FluMist caused the vaccinee's neuromyelitis optica ("NMO") based on Dr. Tornatore's testimony.

Respondent has been willing to settle cases, obviously less expensive than this one, in which FluMist was the vaccine at issue. See Lynch v. Sec'y of HHS, No. 12-676V, 2014 WL 2920653 (Fed. Cl. Spec. Mstr. June 2, 2014) (FluMist caused optic neuritis: $180,000); Peterson v. Sec'y of HHS, No. 10-119V, 2011 WL 6412119 (Fed. Cl. Spec. Mstr. Oct. 28, 2010) (FluMist followed hours later by left-sided weakness and ataxia: $35,000); Downing v. Sec'y of HHS, No. 09-582V, 2010 WL 3074386 (Fed. Cl. Spec. Mstr. July 13, 2010) (FluMist caused encephalitis: $70,000). The undersigned notes that the onset interval in Peterson was hours, not days.

Among the decisions involving Shyface decided by the undersigned which she has discussed with counsel throughout the progression of this case is Herkert, in which the onset interval was one day. Herkert, No. 97-518V, 2000 WL 141263. In Herkert, the 18-month-old boy and his family had been experiencing cold-like symptoms. He appeared to be well when he received DPaT, but then, the evening of the vaccination, he was drowsy. The next day, he had transverse myelitis ("TM") at the cortical (neck) section of his spinal cord. Because his palms were red, the hospital staff attributed the TM to cytomegalovirus ("CMV"), the virus the family had been fighting. Petitioners' expert testified that the vaccine modified the child's immune system so that it could no longer fight off the CMV. The undersigned held, based on petitioners' expert's testimony, that both the CMV and the vaccine were substantial factors in causing the child's TM.

The parallels between Herkert and the instant action are significant. L.A. was also fighting off an infection that his father and younger brother presumably had. He seemed to be winning the battle, although in the morning of the day he received FluMist, he still had a fever of 101 degrees, which Dr. Gans described as his immune system still fighting the infection. When L.A. saw his pediatrician in the afternoon, he had no symptoms and no fever. Yet in the next two days, culminating in his grand mal seizure, his fever returned and his somnolence and other

symptoms presented themselves. He was never the same again. Dr. Tornatore described the effect of FluMist on L.A. as synergistic with the underlying infection, be it *Mycoplasma pneumoniae* or some other illness, so that he became markedly worse.

Dr. Gans doubted that FluMist could have the synergistic effect that Dr. Tornatore described because L.A. had received FluMist twice the year before and he was already vaccinated against the same strains of flu virus in 2010 as he was in 2009. Therefore, Dr. Gans said the antigens in the 2010 FluMist that L.A. received would not have evoked a strong response. The undersigned asked her why public health doctors recommend people receive three hepatitis B vaccinations and two hepatitis A vaccinations if the first vaccination is sufficient for immunization. Dr. Gans replied that with killed virus vaccines, the immunizing process needs repetition, but with attenuated live viral vaccines, the immunization process is complete with the first vaccination, as in MMR vaccine, possibly with a booster needed later on. Beyond the fact that hepatitis B vaccine is a recombinant vaccine, not a killed-virus vaccine, Dr. Gans' answer does not make much sense. It is standard policy to receive either a killed-virus flu vaccine or a FluMist vaccine annually. If an attenuated live-viral vaccine is sufficient to confer immunity, then there should be no other FluMist administered unless the viral strains differ from a prior year's FluMist components. Therefore, the undersigned finds Dr. Tornatore's testimony more credible on this point than Dr. Gans' testimony.

All three of respondent's experts emphasized that L.A.'s pediatrician was correct to administer FluMist the afternoon of December 29, 2010 because of the public health policy of not missing an opportunity to vaccinate a child. The undersigned does not set public health policy, but notes that in Nash, another of her decisions that she has repeatedly mentioned to counsel, a young boy went to the pediatrician with a fever. See Nash, 2002 WL 1906501. The doctor vaccinated him with whole-cell DPT and his fever became worse, landing him in the hospital with pneumococcal meningitis. The reason the boy had fever when he went to the pediatrician was due to his bacterial infection. The undersigned held that both the pneumococcus and the DPT were substantial factors in causing his pneumococcal meningitis. The fact that the pediatrician observed the public health policy of not missing an opportunity to vaccinate is irrelevant to whether or not the vaccination caused the child's condition.

The undersigned finds that the same is true in the instant action. No doubt, the pediatrician took the opportunity to vaccinate L.A. since he was there with his younger brother. The pediatrician thought what he identified was a viral syndrome was resolved since L.A. was not symptomatic in the office and his temperature was normal. The question of whether the pediatrician was following sound public health policy has no bearing on whether FluMist had an effect on L.A. The undersigned finds that FluMist, through its effect on L.A.'s immune system, brought back the infection he was fighting and it resulted in BSN. The undersigned finds that both FluMist and the pre-vaccine infection were substantial factors in causing L.A.'s BSN and that, but for FluMist, L.A. would have successfully fought off the infection and not have developed BSN, which Dr. Tornatore called a vanishingly rare disease. The medical literature discussing BSN repeatedly mentions the abrupt nature of the onset of BSN, including some

individuals who have onset within two days of an immune trigger. After the hearing, respondent filed an article entitled, Acute Disseminated Encephalomyelitis. An Update, by T. Menge, et al., 62 Arch Neurol 1673-80 (2005). Ex. I. The authors state the typical latency period between a febrile illness and the onset of neurological conditions is 7-14 days, but may be longer in a case of vaccination-associated ADEM. Id. at 1674. This latency period is in contradistinction to the following articles:

1. Goutières and Aicardi, concerning destructive lesions in the basal ganglia of children, which respondent filed as Ex. C, Tab 1, and which petitioners filed as the fourth attachment to Dr. Tornatore's report (Ex. 46), in which one of the children had destructive basal ganglia lesions two days after pharyngitis;
2. Goenka, which petitioners filed as the fifth attachment to Ex. 46, in which one boy had acute necrotizing encephalopathy two days after having pyrexia, diarrhea, and vomiting;
3. Yuan, concerning *Mycoplasma pneumoniae* causing BSN, which petitioners filed as Ex. 57, in which an eight-year-old boy had central nervous system symptoms of Parkinsonism and dystonia one day after having respiratory symptoms, and a five-year-old boy had encephalopathy and dystonia two days after having respiratory symptoms;
4. Tenembaum, concerning ADEM, which petitioners filed as Ex. 63, which states onset of ADEM occurs from two days to four weeks after an antigenic challenge; and
5. Stratton (ed.), part of a chapter on encephalitis and encephalopathy after influenza vaccine, from a book entitled Adverse Effects of Vaccines. Evidence and Causality, which petitioners filed as Ex. 64, in which the editors include a description of an article about a woman who had vomiting, fever, and a stiff neck, diagnosed as meningoencephalitis, two days after receiving flu vaccine, similar to her experience the prior year when she had similar symptoms after receiving flu vaccine.

The undersigned finds no difficulty in ascribing causation in a two-day interval in the context of immune activation (or synergistic effect) including repeated and prolonged fevers. Although Dr. Gans opined that L.A.'s onset might be within one day and not two days, it is difficult to agree with her because systemic symptoms of somnolence, fever, and headache can occur post-FluMist. As Dr. Tornatore testified, the clearest neurologic sign was L.A.'s seizure two days post-FluMist.

Respondent's experts had an additional reason to opine that FluMist played no role in causing his BSN: none of L.A.'s treating doctors wrote that FluMist was the cause of L.A.'s BSN. The Federal Circuit in Capizzano emphasized that the special masters are to evaluate seriously the opinions of the vaccinee's treating doctors since "treating physicians are likely to be in the best position to determine whether a logical sequence of cause and effect show[s] that the vaccination was the reason for the injury." 440 F.3d at 1326. See also Broekelschen v. Sec'y of HHS, 618 F.3d 1339, 1347 (Fed. Cir. 2010); Andreu v. Sec'y of HHS, 569 F.3d 1367, 1375 (Fed. Cir. 2009). The reason the Federal Circuit emphasized the opinions of treating doctors in

Capizzano was that the then-chief special master dismissed petitioner's allegation that hepatitis B vaccine caused her rheumatoid arthritis ("RA") even though four of her treating physicians wrote in their medical notes that the vaccine did cause her illness. Capizzano, 440 F.3d at 1323. This was an Althen prong two analysis, i.e., did hepatitis B vaccine cause petitioner's RA, since the then-chief special master held that hepatitis B vaccine could cause RA under Althen prong one. Id. at 1322.

In the instant action, respondent's experts used the lack of treating doctor opinion that FluMist caused L.A.'s BSN in an Althen prong one analysis, i.e., FluMist cannot cause or have a synergistic effect with a pre-vaccine infection to cause BSN. Arguendo, if FluMist cannot cause BSN or have a synergistic effect with an infection to cause BSN, it did not cause BSN or have a synergistic effect with an infection to cause BSN in this case. However, the lack of treating doctor support that FluMist caused L.A.'s BSN is not uniform. In the discharge summary from Wolfson Children's Hospital on February 2, 2011, Dr. Raj D. Sheth, a neurologist, said L.A. had encephalitis of unknown etiology, although he posited a possible autoimmune encephalitis due to the positive mycoplasma IgM. Med. recs. Ex. 2, at 144, 145. On the same date, Dr. Harry S. Abram, L.A.'s treating pediatric neurologist, diagnosed L.A. with encephalitis possibly autoimmune vs. infectious and encephalopathy. Med. recs. Ex. 18, at 22. In 2013, however, Dr. Abram wrote to petitioners' attorney that L.A. had significant neurological disabilities secondary to his "vaccine-related encephalopathy." Med. recs. Ex. 52, at 33.

The undersigned has seriously evaluated the diagnoses of L.A.'s treating doctors. But she also recognizes that they were not involved in the litigation of this case and did not read the expert reports and appended literature, or listen to the experts' testimony. The Federal Circuit's direction in Capizzano for special masters to consider seriously the opinions of the vaccinee's treating doctors is consistent with 42 U.S.C. § 300aa-13(b)(1)(A) and (B), directing the special masters to consider the entire record, including the diagnoses and medical judgments of doctors. However, the same statutory directive says, "Any such diagnosis, conclusion, judgment, test result, report, or summary shall not be binding on the special master or court." Section 300aa-13(b)(1). Thus, the undersigned concludes that the lack of any treating doctor except Dr. Abram in 2013 to opine that FluMist either caused L.A.'s BSN or had a synergistic effect on his pre-vaccine infection to cause L.A.'s BSN is not determinative of the outcome of this case.

Respondent's counsel was accurate in the beginning of this hearing when he called L.A.'s parents heroic. L.A. is also heroic. He had a devastating brain injury, which caused serious damage from which he is slowly, but incompletely, recovering. The undersigned advises petitioners' counsel to update the life care plan, which was previously prepared in 2013.

The undersigned finds that petitioners have satisfied the three prongs of Althen:

(1) FluMist, in combination with a co-existing infection, can synergistically affect the immune system's ability to fight off the infection and thus result in BSN;

(2) FluMist in this case had a synergistic effect with L.A.'s pre-existing infection, resulting in BSN; and

(3) two days is an appropriate interval between FluMist administration and onset of BSN where the synergy of FluMist and a pre-existing infection causes BSN.

Petitioners have satisfied the requirements for making a prima facie case of causation in fact.

CONCLUSION

The undersigned finds in favor of entitlement. This case shall proceed in damages.

IT IS SO ORDERED.

December 15, 2016
DATE

s/Laura D. Millman
Laura D. Millman
Special Master